

CLAIMS

1. An extracorporeal filter, comprising:
 - a housing having an inlet for blood;
 - said housing having an interior volume divided into filtrate portions and blood portions;
 - an outlet for waste and ultrafiltrate in flow communication with said filtrate portion of said interior volume of said housing;
 - a cap attached to the housing opposite the inlet, the cap having an outlet port for blood and an infusion port, both the outlet port for blood and the infusion port being connected to the housing such that they open directly to said blood portion of said interior volume of said housing, whereby blood may be diluted by fluid infused in said infusion port; and
 - a filter media received within the housing configured to separate said blood portion of said housing from said filtrate portion of said housing such that communication therebetween within said interior of said housing is provided only through said filter media.
2. The filter of claim 1, wherein the infusion port is adjacent the outlet port for blood such that fluid injected into said infusion port is mixed with blood therein.
3. The filter of claim 1, wherein said infusion port conveys an aqueous replacement fluid .
4. The filter of claim 1, wherein the cap is removably attached to the housing.
5. The filter of claim 1, wherein the port is adapted to receive replacement fluid.

6. The filter of claim 1, wherein the housing has a second cap that carries the inlet.
7. The filter of claim 1, further comprising a second port adapted to receive dilution fluid radially adjacent the inlet.
8. The filter of claim 1, wherein a gap between the filter and the cap defines a headspace.
9. The filter of claim 1, wherein the housing is generally cylindrical.
10. An extracorporeal filter, comprising:
 - a housing having a bundle of parallel tubular filter membranes separating first and second interior volume portions within the housing, said housing having first and second ends with said filter membrane running along a length of said housing between said first and second ends;
 - said housing having a first port with a tubing connector located at said first end in flow communication with said first interior volume portion;
 - said housing having a second port with a tubing connector located at said second end in flow communication with said second interior volume portion;
 - said housing first end having a chamber, said first port opening into said chamber;
 - said housing having a third port proximate said first port and opening into said chamber such that a fluid injected therethrough would mix within said chamber without passing through said filter membrane;

said housing having at least one fourth port in communication with said second interior volume portion;

said first, second ports and said bundle being configured to permit a flow of blood during an extracorporeal blood treatment of at least 50 mL/min and said third port being configured to permit a flow of aqueous dilution fluid of at least 25 mL/min.

11. A filter as in claim 10, wherein said third port has a tubing connector by which replacement fluid may be continuously injected therethrough.

12. A filter as in claim 10, wherein said filter membrane comprises filter fibers.

13. A filter as in claim 12, wherein said housing includes end caps, each enclosing said first and second interior volume portions at a respective one of said first and second housing ends.

14. A filter as in claim 13, wherein said first, second, and third ports are in said end caps.

15. A filter as in claim 13, wherein one of said end caps has said first and third ports and encloses said chamber, said chamber being cylindrical and said third port being arranged such that a flow through said third port flows tangentially to said cylindrical chamber.

16. An extracorporeal filter, comprising:

a housing supporting multiple filter fibers connected to head spaces at ends of said multiple filter fibers, said head spaces being in flow communication through interiors of said filter fibers, said head spaces otherwise being isolated from each other;

a blood inlet in a first of said head spaces with blood flowing from said first of said head spaces to a second of said head spaces through said multiple filter fibers;

a blood outlet in said second of said head spaces, said blood outlet having a dilution fluid inlet with dilution fluid injected into said blood in said second of said head spaces, whereby a potential for clotting in said second of said head spaces is reduced.

17. A filter as in claim 16, wherein said dilution fluid inlet is arranged to generate turbulent mixing of said blood and said dilution fluid in said second of said head spaces.

18. A filter as in claim 16, wherein a direction of flow of said dilution fluid inlet is substantially opposite and parallel a direction of flow of said blood outlet.

19. An extracorporeal filter, comprising:

a housing supporting multiple filter fibers connected to inlet and outlet head spaces joined for flow communication by said multiple filter fibers, said head spaces otherwise being isolated from each other;

a blood inlet in inlet head space arranged to allow blood to flow from said inlet head space;

a blood outlet in said outlet head space; and

a dilution fluid inlet in said outlet head space connected to receive replacement fluid from a source thereof;

said blood inlet and outlets being connected to external blood lines.

20. A filter as in claim 19, wherein a direction of flow of said dilution fluid inlet is substantially opposite and parallel a direction of flow of said blood outlet.